EARTH SHELTERED ROW HOUSING

Alberta
MUNICIPAL AFFAIRS
Innovative Housing Grants Program

EARTH SHELTERED ROW HOUSING

July 1984

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Architects & Urban Designers

The views and conclusions expressed and the recommendations made in this report are entirely those of the authors and should not be construed as expressing the opinions of Alberta Municipal Affairs.

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FOREWORD

The project documented in this report received funding under the Innovative Housing Grants Program of the Alberta Department of Housing. In May, 1986 the Alberta Department of Housing was amalgamated with Alberta Municipal Affairs which is now responsible for issuing this report.

The Innovative Housing Grants Program is intended to encourage and assist housing research and development which will reduce housing costs, improve the quality and performance of dwelling units and subdivisions, or increase the long term viability and competitiveness of Alberta's housing industry.

The Program offers assistance to builders, developers, consulting firms, professionals, industry groups, building products manufacturers, municipal governments, educational institutions, non-profit groups and individuals. At this time, priority areas for investigation include building design, construction technology, energy conservation, site and subdivision design, site servicing technology, residential building product development or improvement and information technology.

As the type of project and level of resources vary from applicant to applicant, the resulting documents are also varied. Comments and suggestions on this report are welcome. Please send comments or requests for further information to:

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I. INTRODUCTION

The purpose of this study was to investigate the feasibility of developing bermed, multi-family housing projects on properties created by road widening programs within the City of Calgary. The notion is advanced in an attempt to realize the double savings of energy efficient units on remnant properties deemed to have little or no value because of transportation impacts.

This report is made possible by a research grant from the Alberta Department of Housing. The work included:

a) Development of environmental criteria for site selection;
b) Identification of potential sites in Calgary;
c) Selection of a specific site for detailed design work; and
d) Design Development.

This information was presented to the City of Calgary in the form of a proposal to gauge their willingness to approve in principal the construction of a 'demonstration project' within its boundaries.

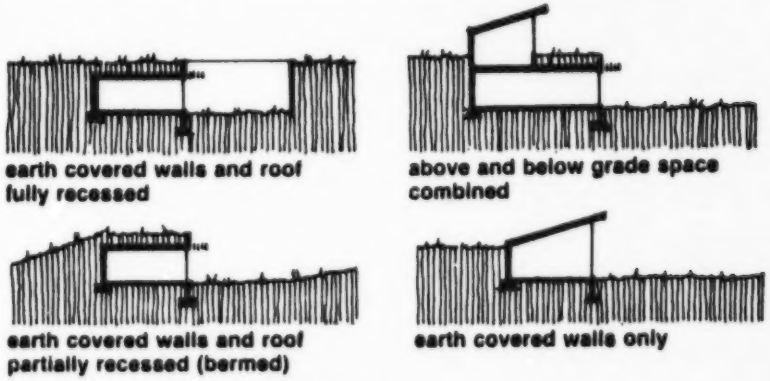
II. EARTH SHELTERED HOUSING: A Definition

In recent years the concept of earth sheltered, or underground, housing has been gaining in popularity in North America, particularly in the American Mid-west. In addition, there have been an increasing number of books and articles describing a broad range of earth sheltered house designs, further advancing the popularity of earth-sheltered housing.

Perhaps the best description of the earth sheltered house is a house in which at least 50% of the exterior envelope is covered by earth, a definition which recognizes that the relationship of the house to the ground surface can vary considerably from site to site.

As the accompanying diagrams indicate, it is not in fact necessary for an earth sheltered house to be below the natural ground level at all.

EXHIBIT NO. 1 - DIAGRAMS OF EARTH SHELTERED HOUSING


earth covered walls and roof fully recessed
above and below grade space combined
earth covered walls and roof partially recessed (bermed)
earth covered walls only

The reasons for constructing earth sheltered housing units are apparent. "In broad terms, earth sheltering uses the earth as a barrier and a moderator. The earth moderates temperature extremes in the air, and moderates surface vibrations and airborne noise. It acts as a barrier to storm and wind effects, ultraviolet degradation and an undesirable visual environment. It has a large thermal mass which can work well with an

intermittent energy supply such as solar energy. The earth is also a natural element which supports vegetation and, hence, the other life processes on which we depend. Using the earth to shelter a house or building, is a means of providing a natural barrier to many of the undesirable climatic and man-made effects of a particular area. The impact of the building on the surrounding environment will also be lowered, allowing more of the land's surface to remain in a natural state. Furthermore, and of particular importance at the present time, earth sheltering serves as a passive means of lowering the dependence of the building on artificial means of climate control derived from fossil fuel energy".[1]

[1]The Underground Space Centre, University of Minnesota. Earth Sheltered Housing: Code, Zoning and Financing Issues. U.S. Department of Housing and Urban Development, Washington.

III. MINNEAPOLIS 'FIELD TRIP'

The City of Minneapolis, Minnesota, has become the focus of the earth sheltered movement in North America. A field trip to the Underground Space Centre at the University of Minnesota campus was conducted by the writer from July 18 to 21, 1982. Dr. Ray Sterling of the Underground Space Centre developed a list of sites, consisting of both residential and commercial/institutional uses, to visit throughout the State of Minnesota.

Of particular interest to this study was Minneapolis' Steward Town House development, to date the only multi-family earth sheltered project on the North American continent. The fact that it is constructed adjacent to a major roadway makes the Steward Town House example very relevant to this study.

The trip proved most beneficial. Firstly, it served to demystify the concept of designing and constructing earth sheltered buildings. The notion is based on clear thinking and practical construction principles. Secondly, it proved that the best way to begin the process of public acceptance for earth sheltered structures is by action. The Minneapolis experiment began with a small group of believers with the tenacity to transform their theories into reality. Their action, in turn, was witnessed by others who then built similar structures until the concept became commonplace to the area.

IV. SELECTION CRITERIA

The issues in establishing criteria for the selection of a site suitable for an earth sheltered demonstration project adjacent to a major roadway within the City of Calgary are, the property's environmental assessment, its site context, the degree of transportation impact on the site and, to a lesser extent, land ownership. A list of evaluative criteria concerning these issues has been assembled below.

1. Environmental Assessment

"Selection and planning a site for an earth sheltered house is usually the first and one of the most important aspects of the entire design process. For conventional above-grade housing, site selection and planning are often routine matters since typical designs for such houses are well known and important energy savings considerations are often ignored. With any well designed energy efficient house it is important to clearly understand the impact of basic site considerations such as proper site orientation as well as the location of vegetation on the site. In order to select and plan a site for an earth sheltered house, it is also important to understand various site considerations which are particularly relevant for this unique type of housing. These include topography, soil and groundwater conditions."[1]

a) Solar Orientation:
To provide access to the sun for as many units as possible, identification of solar orientation patterns must be considered.

South facing: most desireable
Southeast & Southwest facing: desirable
East & West facing: less desirable
North facing: undesirable

[1]The Underground Space Centre, University of Minnesota. Earth Sheltered Housing Design: Guidelines, Examples and References. Van Nostrand Reinhold Company, 1979.

b) Topography:
Land topography should be mapped to show its slope in order that the potential of a site can be assessed in terms of its suitability for earth sheltered housing. This concept can be applied to sites ranging from a ground slope of 1% to 8% (atrium houses) or from 9% to 25% (bermed houses). Access roads usually should not exceed an 8% slope in northern climates.

Steeper south, southeast and southwest slopes allow for significantly higher values of solar gain than gentler slopes at any given period of day or month. In evaluating land in terms of slope exposure and the net gains from solar radiation, land can be divided into the following zones:

i) Zones of optimal gain;
ii) Zones of partial gain (spring and fall, morning and afternoon); and
iii) Zones of no appreciable gain.

c) Shadows:
Net heat gain can be significantly altered by shadows cast by neighboring land forms, buildings or vegetation. When applicable, a shadow map should be prepared illustrating shaded areas and areas free of shade for all seasons.

d) Vegetation:
All existing vegetation should be mapped, identified and assessed in terms of hardiness, impact on development, health, size and aesthetic quality. The map should indicate whether the vegetation is to be retained or removed.

Shadow patterns cast by individual or major stands of trees which remain after development can greatly alter the micro-climate and, thus, become a site determinant.

e) Winds:
The moderating impact of prevailing winter and summer winds must be assessed in terms of intensity, impact on land or building forms and thermal effects.

If applicable, a wind-shed map should be drawn, indicating unprotected zones, to further aid in the determination of the most suitable location of the earth sheltered housing on the site.

2. Site Context

A site does not exist in isolation. It should be looked at in the context of its surroundings to gain a clearer picture of opportunities as well as constraints. Some of the factors include the following:

a) City Amenities:
The proximity to regional facilities such as schools, shopping centres, churches, convenience stores, transportation, parks and other amenities, natural or manmade, is an important marketing factor for any housing development. Since the sites considered for selection are remnant lands usually within existing neighborhoods, such amenities can be expected to be in place.

b) Land Use:
Adjacent existing or proposed land uses should be assessed to determine potential adverse impacts. Existing land use designation for the sites in question are to be identified to determine the necessity for reclassification.

c) Access:
Road access should not be a problem as infill sites are generally adequately serviced by either standard residential roads or have lane access. It is best if sites have access to cul-de-sacs created as a result of road closures or widenings.

d) Utility Services:
Usually, earth sheltered housing built in already serviced areas can easily be connected to existing gravity systems. However, detailed study should be done at the feasibility stage to determine availibility, location, depth, capacity and cost of servicing.

3. Transportation Impact

As this study is intended to evaluate the potential of constructing earth sheltered housing next to major roadways, the severity of transportation impact is most important. Relevant issues relating to the impact of the roadway include the size and carrying capacity of the roadway and the feasibility of earth sheltering to buffer traffic generated noise and vibration.

Traffic noise is dependent upon traffic volumes and speed, distance from the noise source and the presence of prevailing winds. Traffic generated vibration travels through the ground in a way that is dependent upon the geology of the land's subsurface. Some soils do not absorb vibration waves readily while other soil types can transmit vibration waves for long distances. Because vibration transmission varies with soil type, a specialist soils engineer should be consulted when addressing this concern.

Consideration should also be given to both the visual improvements due to roadway berming and the capability of the lot impacted by transportation corridors to accommodate conventional housing.

4. Ownership

The final criteria, though of lesser importance, concerns land ownership. As it was the intention of this study to solicit the City's assistance in the construction of a demonstration project, it was felt that acquiring a property presently owned by the City might prove beneficial.

V. SITE SELECTION AND ASSESSMENT

It was hoped that the City of Calgary Planning, Transportation or Land Departments possessed suitable mapping to locate under utilized remnant properties adjacent to major roadways. Since these scraps of land were deemed to have little or no value, such mapping did not exist. An initial attempt to select potential sites involved simply driving along major transportation corridors, or roads recently widened, in search for areas of opportunity. A drive through Calgary from its Northwest to Southwest boundaries revealed many parcels of land suitable for earth sheltered housing. However, in the interest of practicality it was found necessary to focus the study on a manageable number of parcels of land directly impacted by major transportation systems. Five sites were selected for further consideration and they are located on Exhibit No. 2, page 10. The next step involved analysis of each property's ability or inability to accommodate conventional housing within its boundaries.

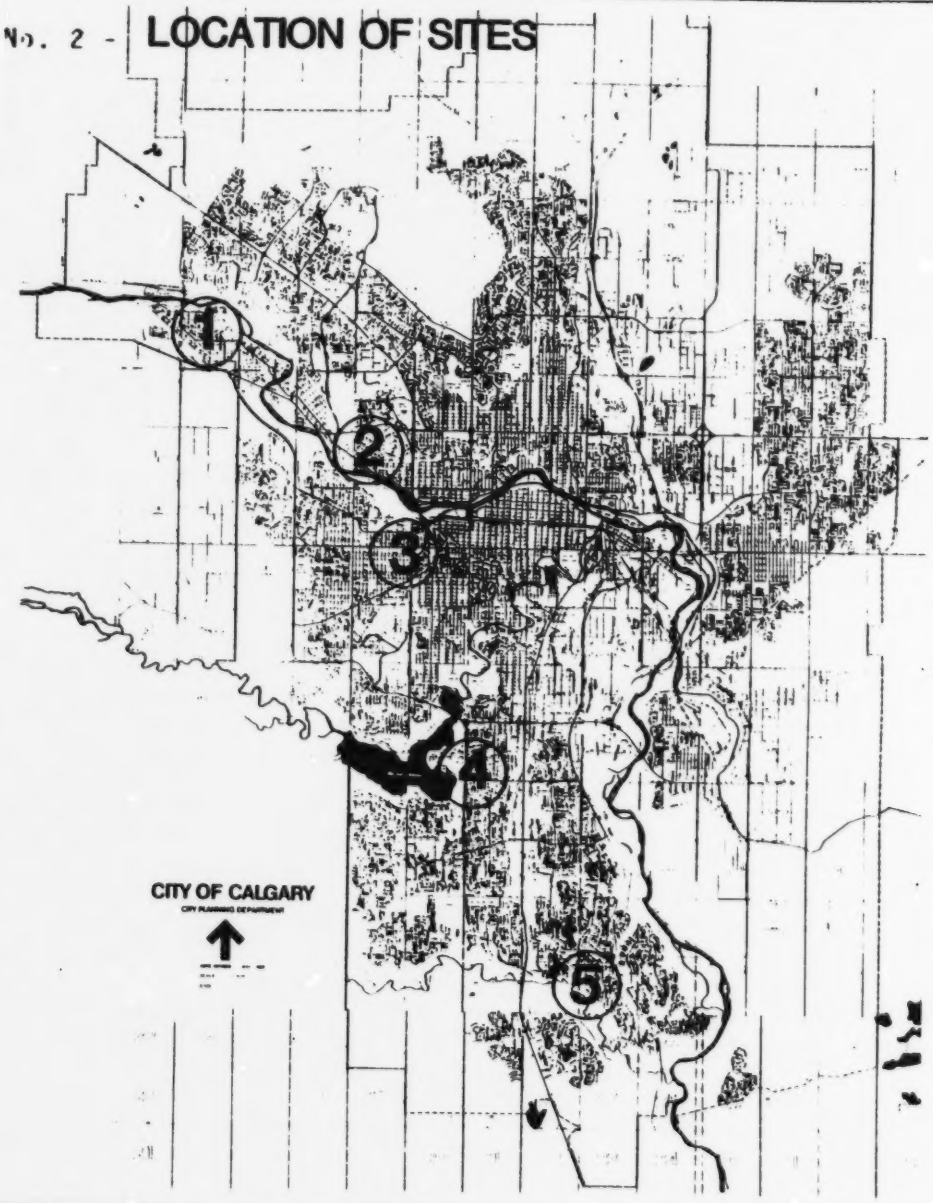
For the sake of the brevity, only Site '3', the one which scored the highest from the viewpoint of suitability in reference to site selection criteria, will be analyzed in depth. It is shown on Exhibit No. 3, page 13. Created as a result of the widening of Crowchild Trail, near 21st Avenue S.W., it consists of a number of 50 foot wide R-2 lots which had been 'shaved' considerably to accommodate the new roadway. The land in question is adjacent to a major Calgary roadway and it is unable to accommodate conventional housing. Thus it suited the study purpose.

1. Environmental Assessment

   a) Solar Orientation:
      To maximize earth buffering between the site and Crowchild Trail, the units would likely face west or southwest. Orientation to the sun for maximum heat gain would be necessary to maximize solar efficiency.

   b) Topography:
      The land slopes upward, from south to north, at approximately 4%. Existing grades should not pose a problem in providing useable slopes on which to build.

EXHIBIT No. 2 - LOCATION OF SITES



c) Shadows:
No shaded areas are created by adjacent buildings or land masses, or by existing vegetation in summer. Shading by vegetation is provided late in the day, mainly in winter, to the west.

d) Vegetation:
The south half of the site is totally cleared of all vegetation. The north half is intermittently planted with Ash, Manitoba Maple and Spruce. All vegetation is generally in good health.

e) Winds:
Prevailing Northwesterly winter winds are buffered by the vegetation, buildings and land form to effectively protect the site.

2. Site Context

a) City Services:
The site offers quick and easy access to a variety of amenities, both natural and improved. It is a ten minute drive to Calgary's downtown core and a drive of ten minutes in the opposite direction to the countryside, beyond the City's boundaries. Bus access is nearby, as are a wide array of schools.

b) Land Use:
Recently expropriated for widening of Crowchild Trail, its present zoning is R-2, as are properties adjacent to it. Crowchild Trail is a major source of visual and noise conflict with the site.

c) Access:
The site can be entered off the lane from either 20th or 21st Avenue S.W. It is partially served to the east by a cul-de-sac.

d) Infra-structure:
All needed utility services are readily available.

3. Transportation Impact

The site's Southeast corner is severly affected by the widening of Crowchild Trail S.W. to the point that the subject lots are unable to accommodate conventional housing. From the standpoint of both noise and vibration, it is felt that the property is set back sufficiently from Crowchild Trail.

4. Ownership

The land is currently owned by the City of Calgary.

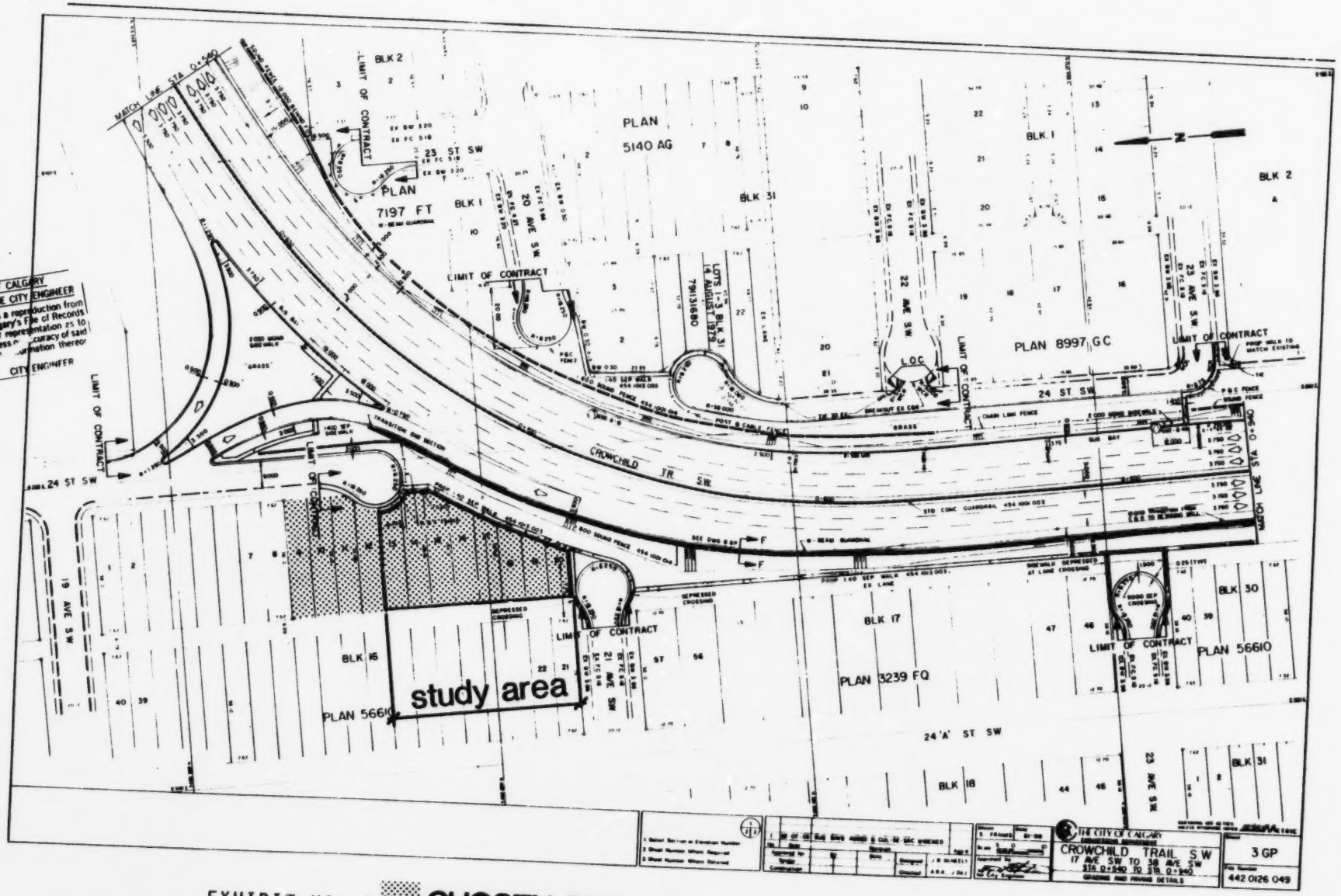


EXHIBIT NO. 3 CHOSEN SITE #3

VI. APPROACH TO SITE IDENTIFICATION

To determine the City's proposed use for the land identified in the Site Selection and Assessment (Section V), a check was made with the Transportation Department. The land-use information was contained in the 'Crowchild Trail South Functional Planning Study'. Presumably because no other use had been considered, its proposed use was shown as "greenbelt". It also became apparent, from looking at the 'functional plans', that the detailed maps of proposed roadways could be of great help in identifying potential sites.

The evaluation procedure identified earlier, namely the study of the sites' orientation, land use, and site access, was simply applied visually in studying the maps contained in the functional planning reports. To further demonstrate this mapping method to locate other suitable building sites, a number of other functional planning studies were obtained from the City Transportation Department. The following additional sites emerged as having potential for further investigation. (see Exhibits 4 and 5).

1. 'South LRT Extension Functional Study':
   Macleod Trail at Canyon Meadow Drive.

2. 'McKnight Boulevard Right-of-Way Report':
   South of McKnight Boulevard in "The Properties", between 36 St. N.E. and 52 St. N.E.

3. 'Memorial Drive East Functional Planning Study':
   South of Memorial Drive, east of Barlow Trail.

4. 'Glenmore Trail East Right-of-Way Study':
   East of 18 St. S.E., at Glenmore Trail.

5. 'Crowchild Trail North Functional Planning Study':
   Both north and south of 24 Ave. N.W., east of Crowchild Trail; and
   East of Charleswood Drive at Crowchild Trail.

6. 'Anderson Road South Macleod Trail Functional Planning Study': East of Sarcee Trail, south of Anderson Road in "Woodbine".

7. East of 24 St. S.W., south of Anderson Road in "Woodlands".

8. East of Elbow Drive S.W., south of Anderson Road in "Southwood".

9. East of Bonaventure Drive, south of Anderson Road in "Lake Bonavista".

10. West of Acadia Drive, south of Anderson Road in "Lake Bonavista".

11. East of Anderson Road, south of Bow Bottom Trail in "Lake Bonavista Downs".

EXHIBIT NO. 4 - TRANSPORTATION MAP SHOWING POSSIBLE SITES AT CROWCHILD TRAIL/ NEAR 26 AVENUE S.W.

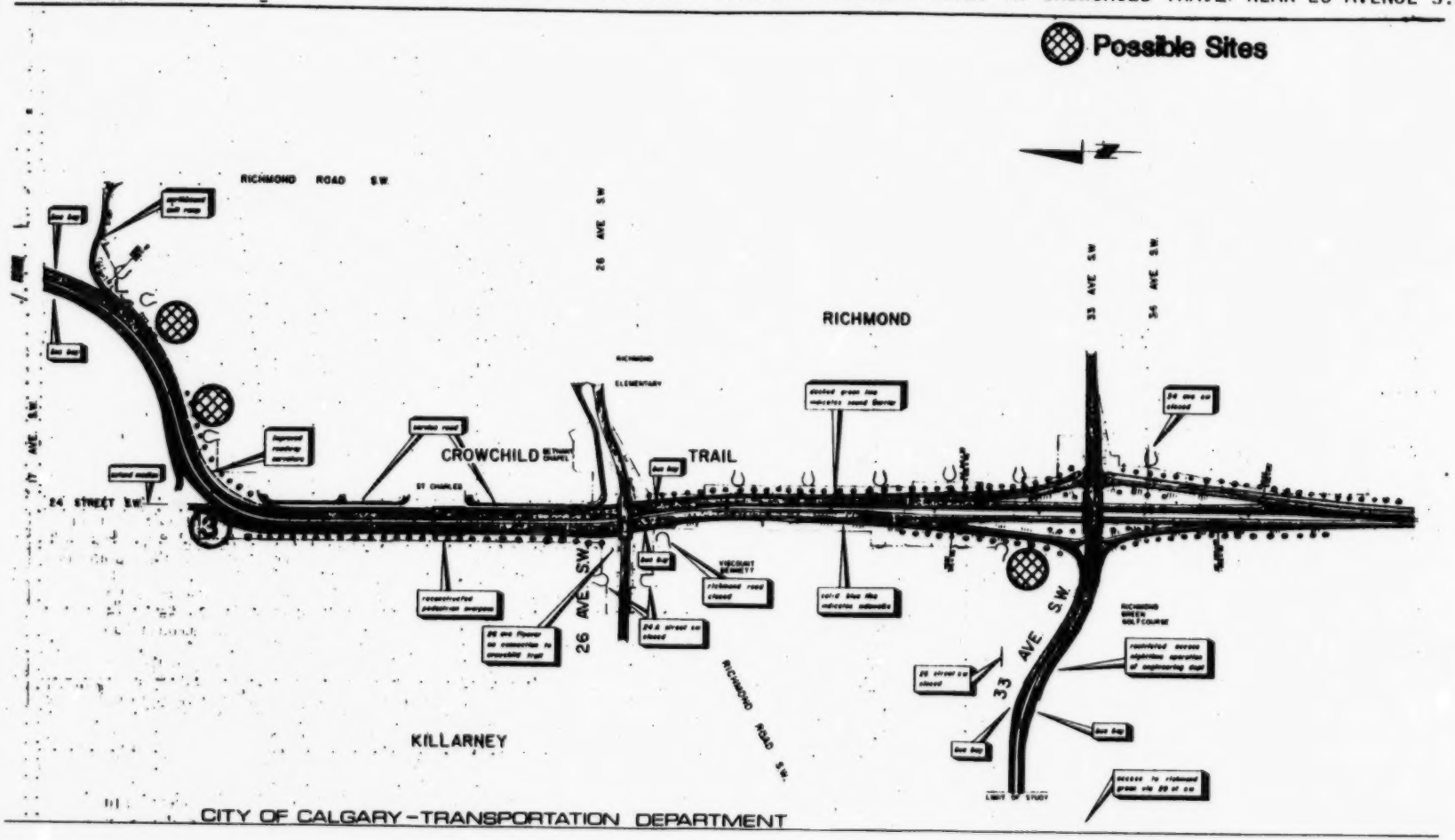
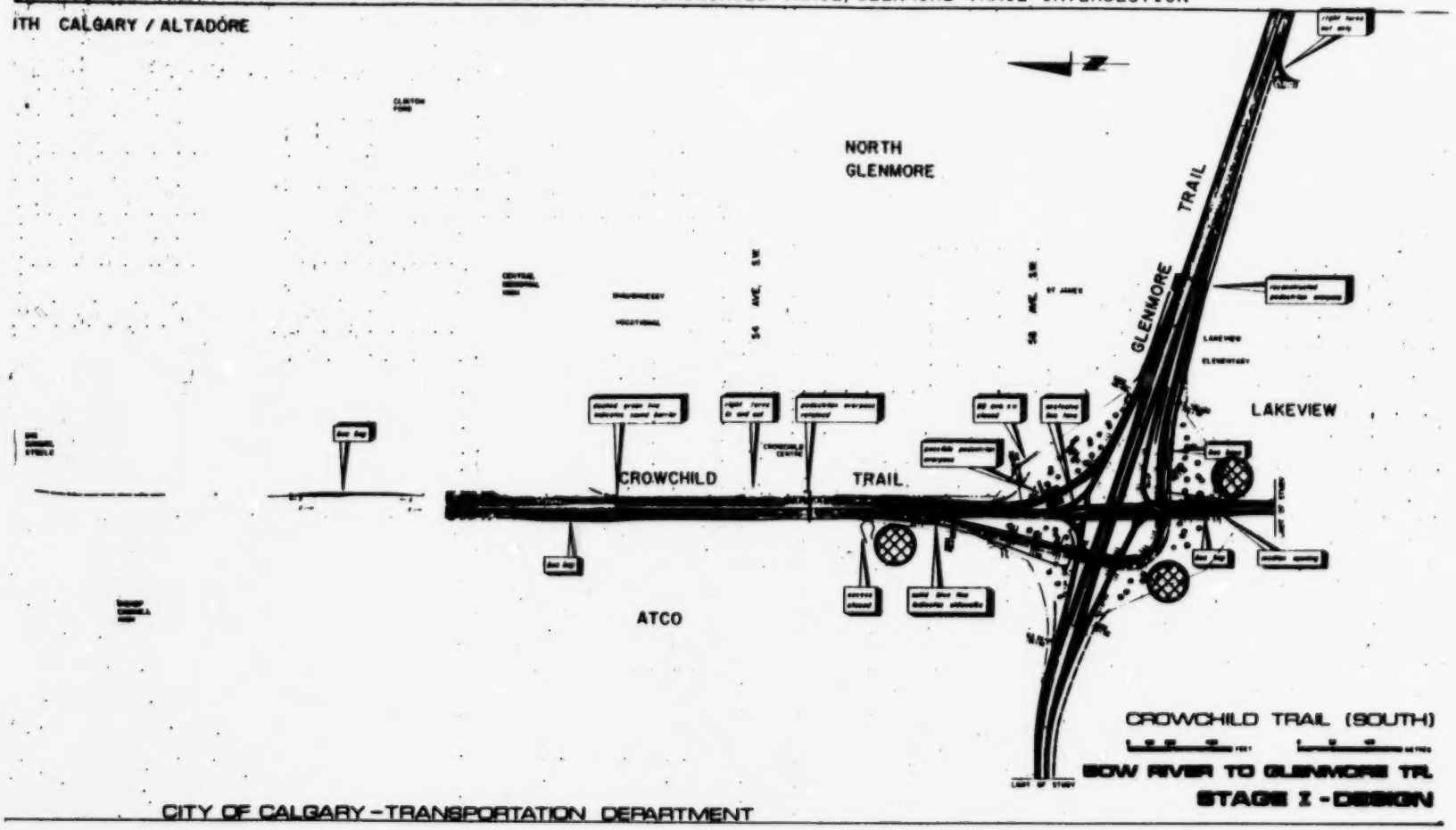


EXHIBIT NO. 5 - POSSIBLE SITES AT CROWCHILD TRAIL/GLENMORE TRAIL INTERSECTION



VII. CONSTRAINTS

This section considers the constraints which might hinder the approval of earth sheltered housing.

The Minneapolis 'Field Trip' had identified three general problem areas in the United States. They were the issues of code, zoning and finance. These issues were checked to see if they might constitute problems in Calgary.

1. Code and Zoning

A number of representatives from key divisions were consulted to 'test the waters' in relation to the City's reaction to the concept of earth sheltered housing. Key divisions contacted included:

a) Community & Housing Renewal Division;
b) Building Regulations Division;
c) Land Use Division; and
d) Transportation Division.

At an initial meeting in September, 1982, the concepts of earth sheltering were explained. In addition the appropriate concerns, with regard to the 'Minneapolis Experience', were distributed to key city representatives with instructions to comment on any major problem areas identified.

The response from the City was, for the most part, favorable. (See appended letters, Appendices A1 to A3.) Both the Land Use and Building Regulations Divisions felt a project could be approved within the context of existing rules. Both indicated a willingness to support any minor variances deemed necessary to assist in the delivery of a suitable demonstration project.

However, the Housing and Community Renewal Division indicated that they would rather not be the orginators of Calgary's first multi-family earth sheltered housing project. It was suggested that there might be negative reaction to the concept of housing rental-assisted tenants in what some might perceive to be 'caves'. While admitting it was largely an educational problem, they were of the opinion that if the private sector appeared to be willing to deliver a demonstration project, they would rather wait and see if the concept could gain public acceptance.

2. Financing

While waiting for a response from City personnel, a representative of Alberta Home Mortgage Corporation (AHMC) was contacted to assess the possibility of an Alberta Home Morgage Corporation mortgage application for earth sheltered housing. AHMC responded that it had in the past declined to approve non-conventional housing types, but would withold judgement concerning bermed housing, pending the submission of an actual project for evaluation.

At a subsequent meeting with the Mortgage Insurance Company of Canada (MICC) reservations were also expressed about financing non-conventional housing. They suggested that while each project was assessed on its individual merit, the recent downturn in Calgary housing prices has resulted in a very narrow market for forms of housing other than free-standing, single family houses. MICC did not indicate willingness to provide the required mortgage insurance for an earth sheltered housing project at this time.

It appears that financing presents a large stumbling block to the provision of earth sheltered housing in Alberta at this time.

VIII. SUGGESTIONS FOR THE TRANSPORTATION DEPARTMENT

While it became clear that the other Divisions could respond to the question of earth sheltered row housing only after submission of an actual project, it was observed that the Transportation Department could promote the concept in the short term with basic policy revisions. They include:

1. Inclusion of Earth Sheltered Housing Option on the 'Functional Planning Check List'

   When road widening programs are under study a functional planning study a check list which includes the evaluation criteria deemed necessary by the appropriate City Departments is circulated for comment. Items for consideration include road classifications and their subsequent design specifications, field inspections for site inventories, land use, appropriate area structure and redevelopment plans and effects on utilities.

   It is proposed that this design checklist be expanded to allow for the evaluation of the possible location of earth sheltered housing on remnant properties created by road widenings, before the fact. In this manner, all newly initiated projects could be listed in a catalogue as potential sites for bermed housing. Similarily, it might prompt decisions to be made early on, for example assembling slightly larger parcels of land to ensure sufficient lot depth to build earth sheltered housing projects.

2. Revised Standards for Rights-of-Way

   It is suggested that new road construction could anticipate the inclusion of bermed housing in the areas currently considered rights-of-way to provide both more housing and better sound attenuation next to larger roadways. This may require adjustments in rights-of-way width.

A benefit from co-ordinating earth sheltered housing with transportation might centre on the concept of this housing form serving as an 'olive branch' to inner city communities at odds with the City's Transportation Department. Grass roots community planning within Calgary's older neighborhoods began largely as a result of the designation of transportation corridors which threatened their way of life. A recent example of this sort of conflict is the Hillhurst-Sunnyside/City battle concerning the impact of light rail transit on established neighbourhoods.

EXHIBIT NO. 6 - TYPICAL RIGHT OF WAY CROSS SECTIONS

BEFORE WIDENING

AFTER WIDENING

AFTER WIDENING WITH INFILL HOUSING

IX. DESIGN DEVELOPMENT

It had been the intention to oversee the design and construction of an actual earth sheltered demonstration project. As such, negotiations were undertaken between the City's Land Department and an interested developer. The intention was to demonstrate the feasibility of earth sheltered housing, financing matters not withstanding. As the question of the availability of mortgages cannot be ascertained until a 'concrete' design proposal comes forth for evaluation, a design concept was developed for further consideration.

1. The Concept

The site selected by the evaluation criteria was considered a good starting point. It is a site severely impacted by the widening of Crowchild Trail S.W., altered to the degree that it can no longer support conventional single family housing. Further, a demonstration project on this site address the physical problems of visual impact and sound attenuation, and have the advantage of enabling the City to realize some revenue by sale of the land and collection of property taxes.

As the site is currently zoned R-2, it does not require reclassification which, it was felt, would increase the chance for development. This is because the time span for the project's approval would be relatively short and there wouldn't be the risk of community opposition to rezoning to accomodate an untried idea. In accordance with this aim, all necessary site set-back requirements and building area coverages were observed.

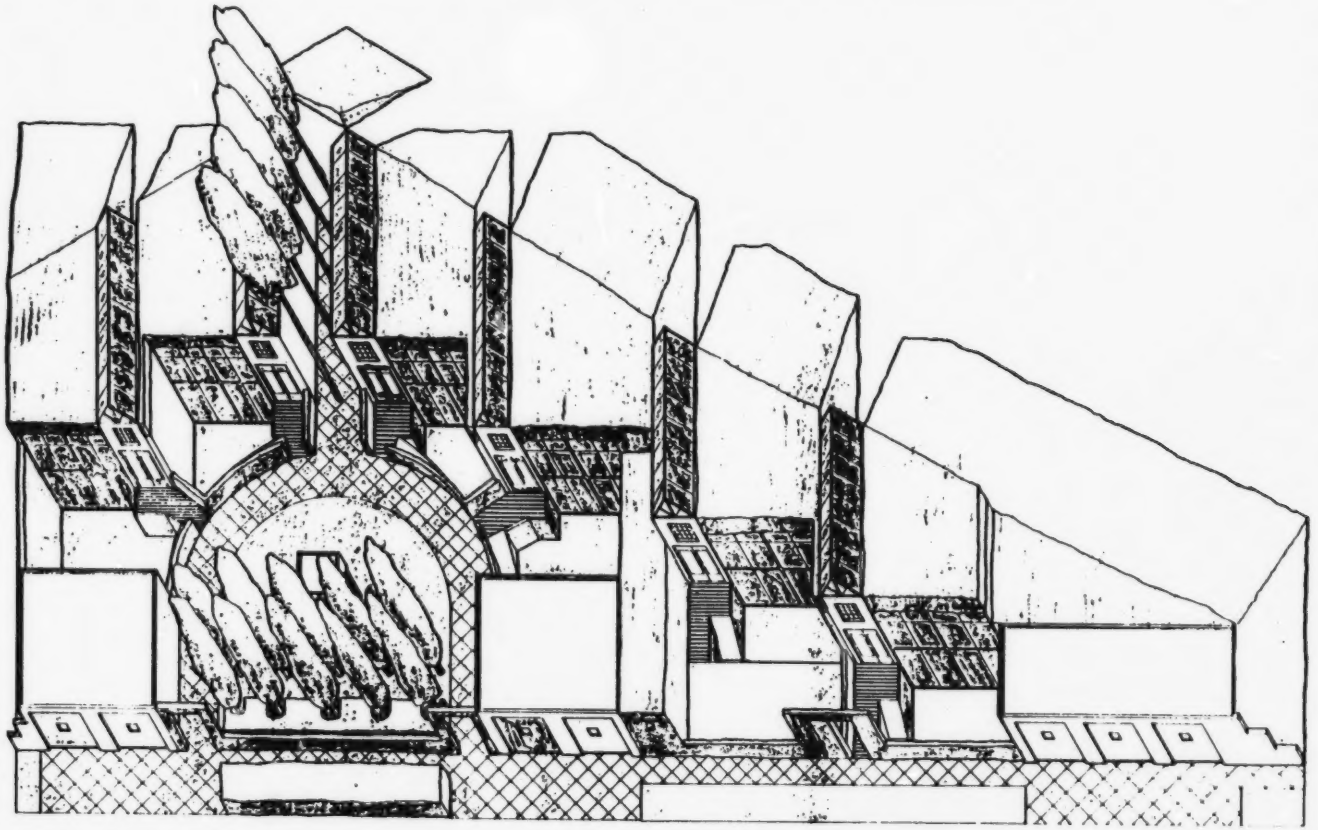
The design of a six unit townhouse project was developed. It was oriented westward toward the lane, turning its back to Crowchild Trail as shown on the drawings, pages 25 to 28. Access would be via the cul-de-sac at the end of 21st. Ave. S.W. Each unit would have 100% parking (1 parking space per unit). The floor plans for the project would be similar to the Steward townhouse development in Minneapolis. The bedrooms would face the window wall of the lower floor with the bathroom and storage located towards the berm, where no natural light is required.

Each unit would have interior access from both the street/berm side and the yard/window wall side. The design should have no major obstacles to approval as it complies with the intent of both code and zoning ordinances, while meeting the stated aims of the study. The concept is illustrated in Exhibits 7,8, 9 and 10.

2. Program Specifications

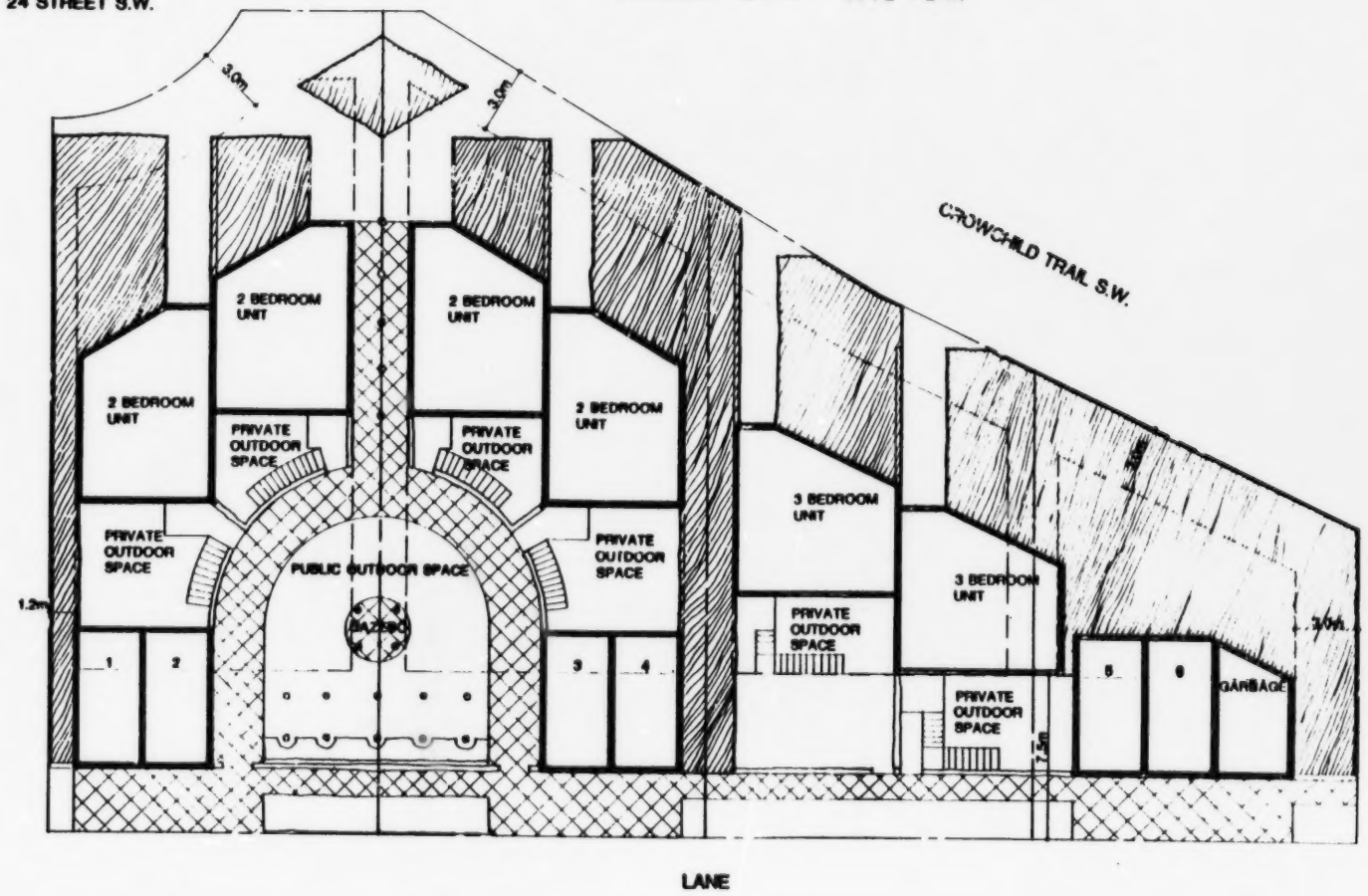
Site Area: 1225 Square Meters (13,182 Square Feet);
Housing Units: 6 @ 110 Square Meters (1185 Square Feet) each; and
Parking: 100% (1 parking space per unit).

EXHIBIT NO. 7 - AXONOMETRIC OF PROTOTYPICAL EARTH SHELTERED HOUSING



AXONOMETRIC

EXHIBIT NO. 8 - SITE PLAN



LAND USE CLASSIFICATION : R2

EXHIBIT NO. 9 - SECTION A-A

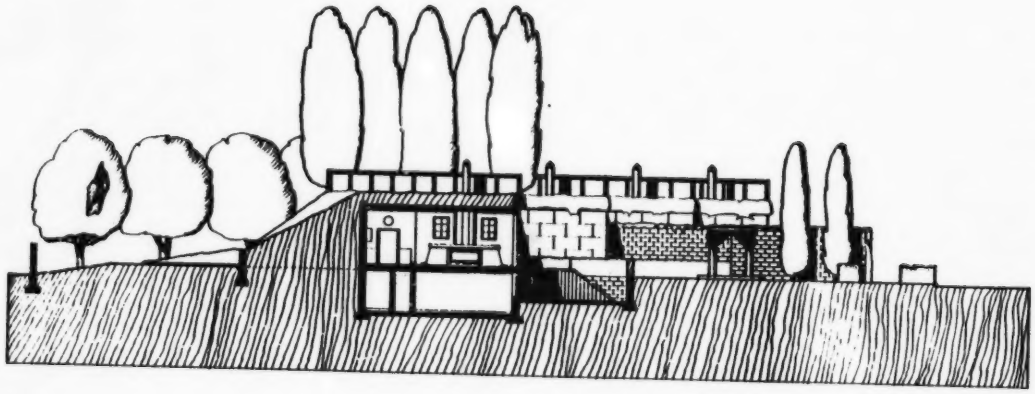
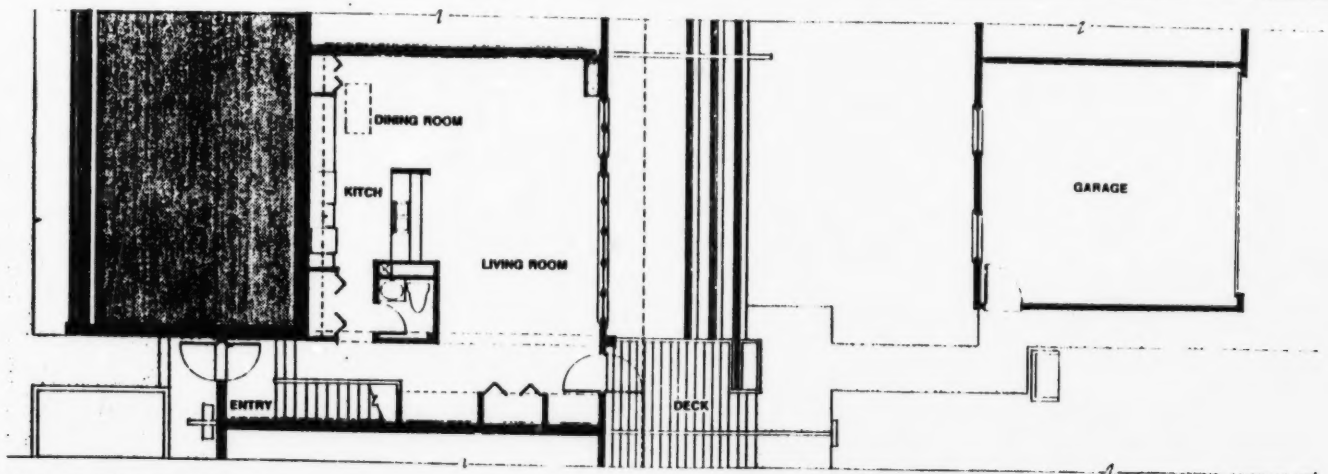
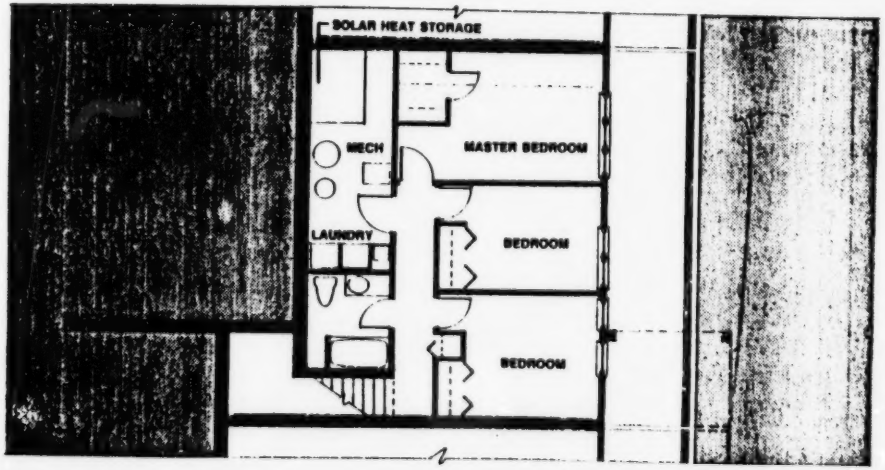


EXHIBIT NO. 10 - TYPICAL FLOOR PLANS



Upper Floor Plan



Lower Floor Plan

X. CONCLUSION

The City was seen to be central figure in this study. It was felt that a number of City Departments could benefit from a co-ordinated effort to address the notion of building multi-family earth sheltered housing adjacent to major roadways. A suitable demonstration project could:

a) test the ability of existing code and zoning ordinances in the approval of earth sheltered housing and determine any possible changes to existing rules and regulations;

b) determine the willingness of the City of Calgary to allow construction of sheltered housing projects on remnant parcels of land;

c) ascertain possible benefits and policy recommendations for the Transportation Department in addressing questions associated with land use and sound attentuation next to major roadways; and

d) allow for the development of a new market for remnant parcels of land.

This report has been prepared to assess the feasibility of earth sheltered housing from the standpoint of a general concept and to consider the opportunity for the construction of Calgary's first multi-unit bermed housing development. As such it lays the groundwork for the eventual construction of earth sheltered housing. A built project will only happen with the careful nurturing of the concept by innovative developers and jurisdictional agencies. Financial approval as well as physical approval will be required.

APPENDIX

THE CITY OF CALGARY
TRANSPORTATION DEPARTMENT (124)

1983 March 10

Mr. Gary Andrishak
The Sturgess Partnership
224 - 11 Avenue S.W.
Calgary, Alberta
T2R 0C3

Dear Gary:

SUBJECT: Earth Sheltered Housing Concept

Further to our recent discussions in the above regard, this is to advise you that the Transportation Department has reviewed your proposal for earth sheltered housing and finds the concept very innovative, with good potential for application in the City of Calgary. There are a number of unique sites, particularly adjacent to expressways in the City of Calgary, that could be candidates for some form of earth sheltered housing.

Good luck on the successful completion of your demonstration project.

Yours truly,

C. M. Storvold
Senior Transportation Planner
Transportation Planning Division

CMS/wlg

RECEIVED MAR 10 1983

P.O. BOX 2100 POSTAL STATION M CALGARY, ALBERTA T2P 2M5 • 268-2111

THE CITY OF CALGARY
TRANSPORTATION DEPARTMENT (124)

1983 July 5 File: 66502

Mr. G. Andrishak
Sturgess Partnership
224 - 11 Avenue S.W.
Calgary, Alberta
T2R 0C3

Dear Mr. Andrishak:

SUBJECT: Earth-Sheltered Housing Proposal
Crowchild Trail, West Side at 21 Avenue S.W.

With reference to our discussions regarding the above, we are satisfied that the design of your project will meet the City's design guidelines for noise and that vibration from traffic should not be a problem.

If you require any further information please do not hesitate to contact me.

Yours truly,

Chris Andrew
Transportation Planner
Transportation Planning Division

CA/wlg

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Al KLIPPERT Ltd.
AND
BOW RIVER CONCRETE PRODUCTS

HOME ROAD and 32nd AVENUE N.W.
CALGARY, ALBERTA

March 9th, 1983

The Sturgess Partnership,
224 - 11 Ave. S.W.
Calgary, Alberta
T2R 0C3

ATTENTION: G. Andrashak

Re: EARTH SHELTERED ROW HOUSING

Dear Sir:

I wish to confirm our recent discussions concerning the above mentioned project. As earlier indicated, should you be successful in receiving a renewal of your research grant to include production of construction documents, and should the City co-operate by a full, or partial donation of the land in question, it is the intention of Klippert Construction Ltd. to construct and market the project.

As you know, our parent company is in the concrete production business. We feel that our branching out into earth sheltered housing, with its heavy reliance on concrete, is a logical extension of product line.

Thank you for your interest in this product.

Yours truly,

Barry Klippert

Barry Klippert

THE CITY OF CALGARY
LAND DEPARTMENT

June 15th 1983

DELIVERED BY MESSENGER

The Sturgess Partnership
Architects & Urban Designers
224 - 11th Avenue S.W.
CALGARY, Alberta
T2R 0C3

Attention: Gary Andrishak

Dear Sirs,

Re: Earth Sheltered Housing
21st Avenue and Crowchild
Trail S.W.

In response to your letter of June 10th, 1983, I would advise as follows:

As a result of our discussions, I am prepared to recommend disposition of the subject lands for the development of earth sheltered row housing. It is acknowledged in your letter that the site will be acquired by Al Klippert Ltd. and developed by that firm; the Sturgess Partnership is acting as an agent and architect, and you specifically are the recipient of a Provincial research grant through the Innovative Housing Grants Program.

Disposition of this site will, of course, be subject to Council approval. It will also be conditional upon the obtaining of a Development Permit and all costs of such application will be borne solely by you and your client.

One further matter remains to be agreed upon and that of course is the value of this land. I am obtaining historical data relative to its acquisition by the City and either myself, or someone will be in a position to discuss value with you and your client in the very near future. This matter can be processed through to Council for approval once this has been discussed.

Yours very truly

Brian R. Musgrove

Brian R. Musgrove, A.A.C.I.
Director
LAND DEPARTMENT

BRM/ys

THE CITY OF CALGARY
PLANNING DEPARTMENT

1982-10-04

The Sturgess Partnership
Architects and Urban Designers
224 - 11 Avenue S.W.
Calgary, Alberta
T2R 0C3

Attention: Mr. Gary Andrishak

Dear Sir,

Re: Earth Shelter Housing (The Sturgess Partnership, Calgary)

I have reviewed the above report and my comments are summarized as follows:

1. UNIFORM BUILDING STANDARDS:

The Alberta Building Code 1981 requirements apply to storeys below grade in the same way as to storeys above grade. Earth shelter housing, as presented in the report, generally shows that 75% of the perimeter walls are below grade. Therefore, the prototype will be considered as one storey basements. As long as these basements do not extend to another storey below, the requirements of Part 9 of the Code shall apply without any modification.

2. PERFORMANCE VS. PRESCRIPTIVE STANDARDS AND PROVISIONS FOR ALTERNATE METHODS AND MATERIALS:

Enforcement of performance standards is in place within this Division and they are processed through the "Equivalency Committee". Qualified equivalencies can be identified, in advance, generally within this Division, unless they are of a nature that may also require consultation at a provincial level. Any perspective standards, tailored particularly for one project, will create potential problems for this Division because such standards seem to set a precedence.

3. MEANS OF EGRESS/EXITS:

Requirements of means of egress in the Alberta Building Code 1981, for single family dwellings and buildings where there is no dwelling unit above another (as in townhouses), can be complied with by providing one exit at or near grade. Two separate exits (means of egress) are required only when travel distance from one floor level to an exit exceeds one storey. Anticipated conflicts as contained in the report, are not addressed in the Alberta Building Code 1981.

4. NATURAL LIGHT AND VENTILATION:

The Alberta Building Code 1981 considers glass areas in clearstorey lights and skylights equivalent to that of glass in windows. The Code also allows for buildings of Residential occupancy to be ventilated by either natural or mechanical means.

5. GUARD RAILS:

For the safety of occupants, the Alberta Building Code 1981 requires that guard rails be provided wherever there is a difference of more than 600mm between adjacent elevations. However, areas with access for maintenance purposes only are accepted.

6 PROHIBITION OF BELOW GRADE SPACE:

Alberta Building Code has no provisions that prohibit below grade space from being considered habitable space provided the requirements of natural ventilation, lighting, and means of egress are met.

7. STRUCTURAL DESIGN:

Design loads for walls and roofs in Earth Shelter Housing is likely to be in excess of 2.4kN/m2, therefore, tables contained in Part 9 can not be applied for design purposes. All structural designs must be carried out by a Professional Engineer licensed to practise in the Province of Alberta.

8. WATER PROOFING:

Minimum standards for water-proofing roofs of underground structures is contained in the Alberta Building Code 1981. Also dampproofing requirements apply when the basement is finished. These provisions are made subject to hydrostatic pressure, and a verification that hydrostatic pressure does not exist will be required if the conditions are to be relaxed.

9. ENERGY USE:

Alberta Building Code 1981 has no specific requirements limiting the type and form of Energy use. Any alternative energy performance feature such as active solar energy may be incorporated if the system has proved reliability.

.../3

In conclusion, I find that most of the concerns contained in this report are based on different codes that are in effect in the United States. It would be more effective if specific concerns (not contained in this report) are addressed to Alberta Building Code 1981. Acceptable access for fire fighting (is one such concern) must be provided in Earth Shelter Housing.

Dee Mc Veigh
Supervisor, Residential Branch
Building Regulations Division

UM/ssw

THE CITY OF CALGARY
PLANNING DEPARTMENT

September 29, 1982

The Sturgess Partnership
Architects and Urban Designers
2nd floor, 224-11 Ave. S.W.
Calgary, Alberta

Attention: Mr. G. Andrishak

Dear Sir:

Re: Innovative Housing-Earth Sheltered Row Housing.

Following the discussions concerning the feasibility of an earth sheltered development in Calgary, the Planning Department reviewed the Land Use By-law 2P80 against what had been determined as zoning conflicts in other communities. There does not appear to be any land use zoning problem with developing earth shelter housing in Calgary. Most of the issues identified such as minimum height requirements and minimum floor areas do not exist in the Calgary's planning legislation. Other items, such as minimum yard dimension can be relaxed at the discretion of the Approving Authority. Further, if there are a number of relaxations required, the Land Use By-law provides the opportunity to draft a specific Direct Control District for what is being proposed.

I have attached the pertinent section of the Land Use By-law for Direct Control Districts. As you can see your proposal would easily fit within the purpose of the designation.

If I can be of any further assistance in this matter, please do not hesitate to phone.

Yours truly,

D.G.N. Watson
Land Use Planner

OUR FILE
YOUR FILE
REPLY ATTENTION OF

P.O. BOX 2100 CALGARY, ALBERTA T2P 2M5